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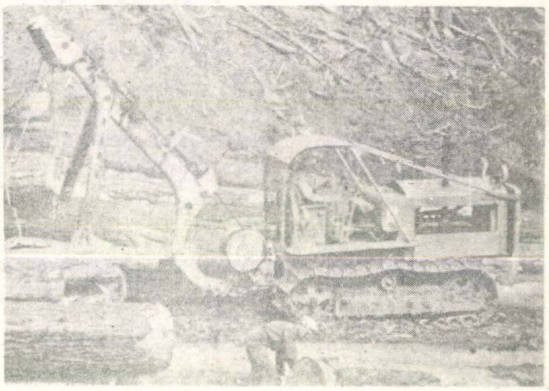
NORTHEASTERN LOGGERS' HANDBOOK

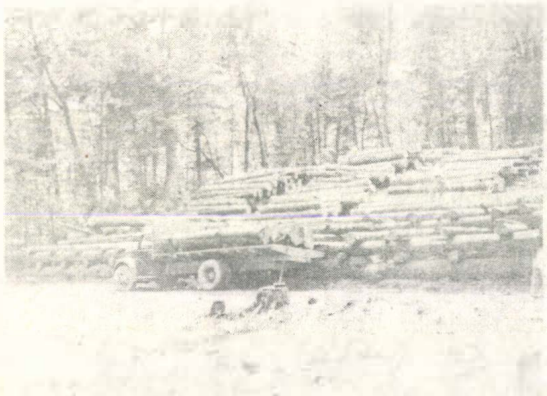
by

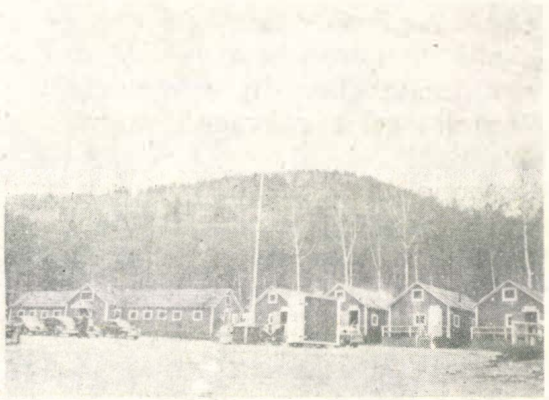
Fred C. Simmons

PRELIMINARY REVIEW EDITION



Easier and Safer Work





Greater Production (more pay) and Better Living Conditions

SECTION 8:— POINTERS ON FELLING TREES

NORTHEASTERN FOREST
EXPERIMENT STATION

United States Department of Agriculture

FOREST SERVICE
NORTHEASTERN FOREST EXPERIMENT STATION

614 Bankers Securities Building
Philadelphia 7, Pennsylvania

V. L. HARPER, DIRECTOR

FOREST UTILIZATION SERVICE
James C. Rettie, Chief

If you want to be a mechanic, you will easily find plenty of good books which will tell you what you need to know. You will also find plenty of instructors and training shops.

What about the young man who wants to make his living by logging? For him there is no good source of information to which he can turn. The books and courses on logging are for the logging engineers--not for the fellow who uses the axe and crosscut.

Why shouldn't there be a simple illustrated handbook which will tell the young woodsman (or the green woodsman) what he needs to know about the care and use of his tools and the best of the old and the new techniques of, and devices for logging? He needs to know the "tricks of the trade" as much as anyone.

We hope that these pages, together with other short papers like it, will finally be put together in a printed NORTHEASTERN LOGGERS' HANDBOOK. We are putting it out in this form first because there seems to be an urgent need for this sort of information; and because we need the help and advice of persons who know about logging in our region before printing. We want the experienced logger to tell us what important things we have missed and where our advice is not good. We want the young man going into the woods for the first time to tell us what parts of it he finds hard to understand, to suggest how it can be made more useful to him. We would like the equipment manufacturers to check our recommendations for use of their products and tell us about new devices they are developing.

Please send criticisms, questions and suggestions to: The Director, Northeastern Forest Experiment Station, 614 Bankers Securities Building, Philadelphia, 7, Penna. Additional copies of this and other publications in this series can be obtained from the same address.

1946

POINTERS ON FELLING TREES

By Fred C. Simmons*

Felling is certainly a most interesting but also about the most difficult and dangerous part of the logger's job. The skills and judgment required cannot be attained by reading a few pages of a handbook. The best that can be hoped from the suggestions that are offered here is that those who read them will avoid some of the more common mistakes.

First Decide Which Way the Tree is to Fall

Before putting axe or saw to the tree, it is necessary to size it up carefully and decide just where the tree should be dropped. Frequently the choice is limited by the layout of the operation and the location of the tree. Inexperienced woodsmen may make unnecessary work for themselves, and take unnecessary chances of injury by jumping into the job too hastily.

If the tree is leaning not more than 5°, has about the same size of limbs all around, and is not being pushed by a strong breeze, it is possible for the fallers to drop it in any direction that they may choose. This is done by proper location of the cuts, by the use of wedges to tip it on the stump, and sometimes by the use of a long pole which is pushed against the trunk 15 or 20 feet from the ground. All of these will be discussed later.

Big trees which lean considerably or have heavy branches on one side can rarely be thrown in the opposite direction. Sometimes it is possible if the wind is just right. Most of these leaners, however, can be thrown 45° to the right or to the left of the direction in which they would naturally fall. It is up to the faller to decide just where in this arc his tree should be directed.

It is always dangerous to fell a tree into another one either of which has dead branches. These are likely to snap off and catapult through the air. These flying limbs are called "widowmakers" and for good reason. It is also unwise to fell a tree straight up a steep slope. Quite often the tree will bounce as it strikes the slope and its butt

*Specialist in Logging and Primary Processing.

will kick back over the stump to strike the unsuspecting faller who thought he was safely away from danger. The butt of the tree may also strike on one side or the other of the stump. There is no way of telling what it will do. The best way is to fell the tree diagonally on the hillside and seek safety on the upper side of the stump away from the direction of the fall. Trees felled straight down a steep slope are likely to be shattered by the fall--particularly if the ground is rough. It is bad practice to let a tree fall across a large rock or stump or across another log. Obstructions like these are likely to break the stem and cause much waste of good timber. Felling across a gully or across a sharp ridge will also shatter the log. Still another hazard to be considered in felling a tree is that it may become lodged in the branches of another and fail tc come down. Half a day can be wasted in bringing down a lodged tree.

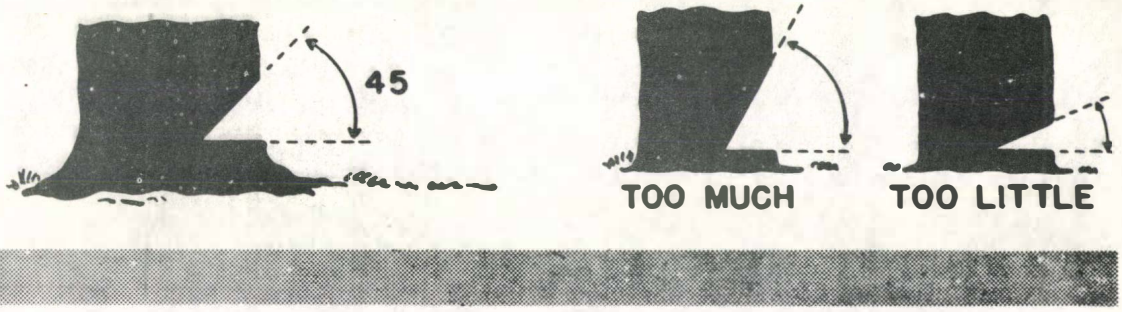
Clear Space in Which to Work

Once the direction in which the tree is to fall is determined, the next step is to clear away the brush and low hanging branches that could interfere with the use of axe and saw as the faller works at the base of the tree. Small wisps of brush are clipped off close to the ground by holding the axe in one hand near the point of balance and the brush in the other. Pull on the brush to provide the necessary resistance to a slicing cut. Larger brush and small trees are cut one-handed also by bending the stem first one way and then the other, making a slanting downward cut near the base. Low hanging limbs are removed in the same way. This elimination of the brush and low limbs is necessary to give the axe full freedom in its swing. The chopper who thinks that he doesn't need to take such precautions may, sooner or later, get his own axe in his neck.

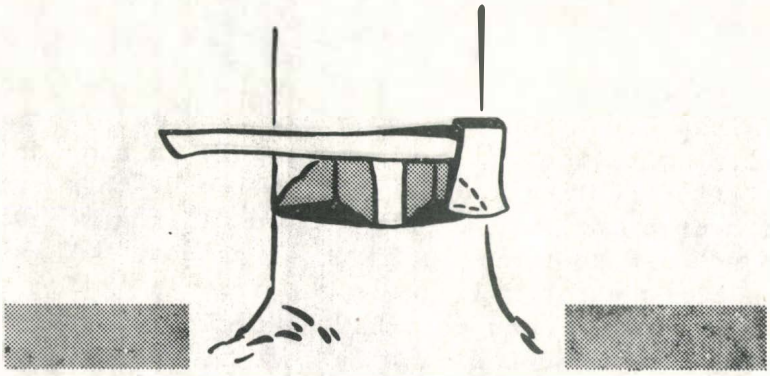
Making the Undercut

The undercut is made on the side toward which the tree is to fall. Its functions are to provide a fulcrum and hinge point on which to tip the tree off the stump in the right direction. The stump should be not more than 12 inches above the ground level on the upper side of the tree. In the past there has been much waste of good wood by leaving stumps too high. Low stumps are also less of a hindrance to skidding. Exception to the 12-inch rule must be made, of course, when a rock or some other obstruction makes a low stump impossible; when the tree butt is too rotten to be cut safely, or when it probably contains nails or other metal. This is very often the case with trees in an old sugar bush or fence row.

Undercuts were once made entirely with the axe. Now, except for the smaller trees, a horizontal saw cut is usually made first, to a depth of about $\frac{1}{4}$ the diameter of the tree. In small trees it may be best to make a shallower cut to permit a wedge to follow the saw on the opposite side. Large leaning trees require a deeper undercut. It is the usual practice to chop the notch above the saw cut on a 45° angle. A larger notch makes unnecessary chopping and a smaller one is too hard to make.

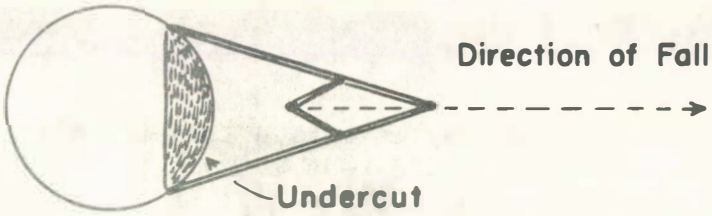


An inexperienced chopper will have some trouble in getting the chips to fall out properly. The best method of chopping is not to let all of the axe edge be buried in the wood. If the heel or the nose of the blade is exposed, the chip tends to roll off easily. This can be done



by working first the near side, then the far side, and then the center of the undercut. In large trees it is necessary to cut a small notch first and then chip down the full sized notch. In very large trees it may be best to make two small notches are worked into one large notch.

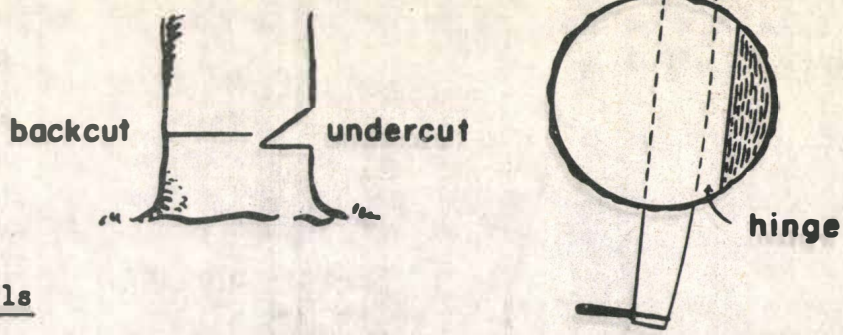
When the undercut is completed it is well to check its direction. The crease at the back side should be straight and at right angles to the direction in which the tree is to fall. One simple test is to push the head of a double bitt axe into the crotch made by the undercut. The handle should then point in the direction in which the tree is to fall. West Coast fallers carry a compass-like tool which they call a "gun stick". The two points are placed one at each edge of the undercut. The apex then points in the direction in which the tree is to fall. This little device is easily made from any scraps of lumber. It might be useful in some of the larger timber of the Northeast.



LOGGERS "GUN STICK"

Making the Backcut

The backcut is almost always made with the saw. It should be about 2 inches higher than the bottom of the undercut. The cut, normally, should be kept parallel with the undercut until only an inch or two of holding wood is left. If the tree has not fallen by this time, it should be tipped over by driving in one or two falling wedges behind the saw. Do not saw deeper into the holding wood. This is needed to serve as a hinge which will guide the tree as it falls. When a two-man crosscut saw is used to make the backcut, each sawyer should keep his partner informed how much is left between his cut and the undercut so that one side will not be cut off too soon.



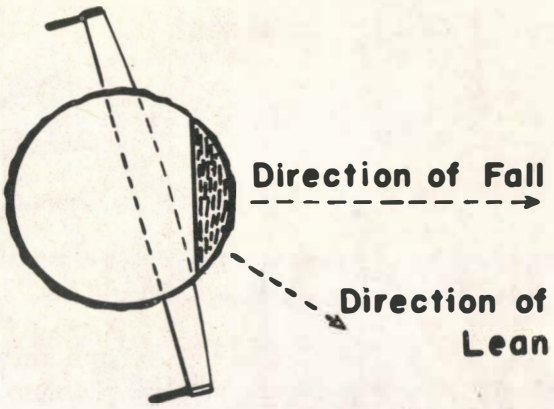
When the Tree Falls

Each man should have planned his getaway before starting to saw. Some trees, especially, if they have rot in them, will let loose and fall in a hurry. It should also be decided who will remove the saw. Many saws have been ruined by leaving them on or near the stump. Never stand close to the stump. There is always danger that the butt will kick back or sideways. The wise faller quickly gets back and to one side of his sawing position, and, preferably from behind another tree he carefully watches the tree as it falls, alert to dodge kickbacks or "widow-makers". Well before the tree goes over one of the fallers shouts "timber-r-r-r" in order to warn anyone who may happen to be in the woods. This may, at first, seem a little silly, but do it anyhow. More men are killed in the woods from falling trees than from any other cause. Never take it for granted that there can be nobody but you and your partner around.

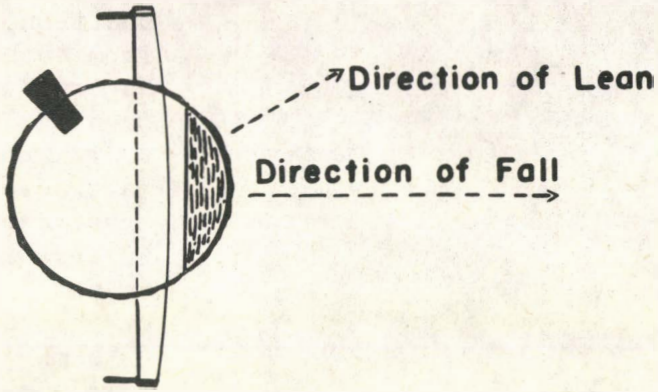
Felling Leaning Trees

When a tree leans slightly in a direction other than the one in which it should be dropped, the direction of fall can be changed a little by "holding a corner". This is done in the backcut simply by leaving

more wood on the side opposite to the one toward which it leans. This acts as a holdback to twist the tree away from the direction in which it leans.

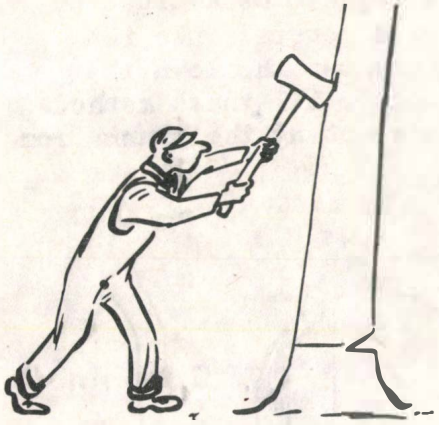


Wedging, either by itself or in combination with this special backcut, can be used to alter the direction of fall. One or more felling wedges are driven into the backcut on the leaning side. This helps to tip the tree into an upright position from which it can be made to fall in the desired direction.

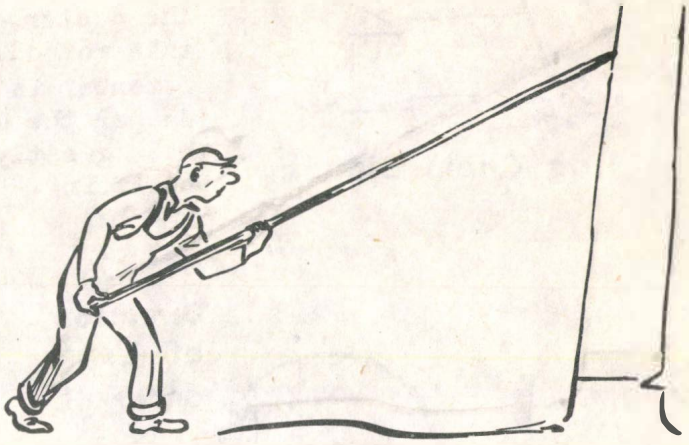


A gusty wind can sometimes be used to help fell a tree in the direction wanted. If the wind is blowing exactly in the desired direction, the fallers merely adjust their rate of cutting so that the last few inches of wood are cut when the breeze is steady enough to take the tree over. If the wind is coming from the opposite direction, the problem is much more difficult. The cutters will have to time their work so that their sawing is finished exactly at the time when the wind has died down and the tree is swaying back from the force of the gust. On some days when the wind is changeable, falling may become so dangerous that it should be discontinued altogether.

Small trees can, of course, be pushed over in almost any direction by hand. The axe should never be used to aid in this kind of pushing.



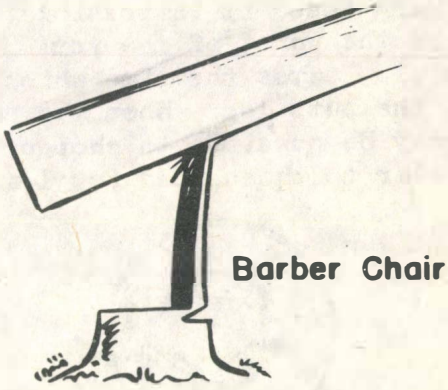
NEVER DO THIS



THIS IS MUCH BETTER

It is likely to slip out of the tree trunk and it can give the person using it a nasty out. A pole from 12 to 16 feet long with a metal pike on the end is much safer and gives far better leverage. Hold the end of it against the shoulder or against the hip--not against the stomach. For large trees where more power is necessary, a "killig" may be used. The rig is described in Section 5 in connection with use of the peavy.

Trees leaning in the direction of fall can be quite dangerous. They are apt to fall prematurely, splintering the stem and thrashing the butt around in unpredictable directions. One common result is the "barber chair" stump. This splitting spoils the most valued part of the tree--the butt log. One method which will usually prevent a leaning tree from splitting in this way is called "sawing off the corners." The backout is halted before there is any danger that the tree will fall. Then each corner is sawed off at an angle. The same result may be obtained by chopping out the corners of the undercut.

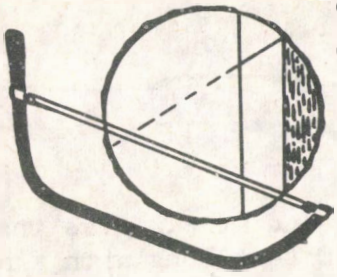


Barber Chair

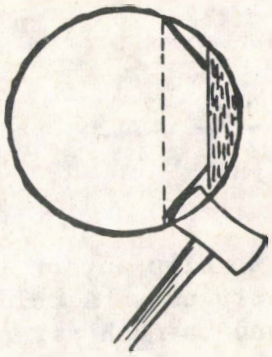
Another method used to reduce splitting of large bad leaners or hollow butted trees is to fasten a log chain around the base of the tree just above the saw back cut. A few wedges driven between the chain and the tree will tighten the chain and prevent serious splitting.

Log Chain Binder

Some valuable leaning trees that can be dropped only in the direction of the lean, can be cut three-fourths through from the leaning side. The saw is then removed, and the cut completed from the backcut side. Splitting or pulling slivers from the center of the log can be avoided by this method. A good general rule to remember is "the greater the lean the deeper the undercut." All these methods help greatly in preventing the trunk from splitting.



Direction of Lean and Fall ------->



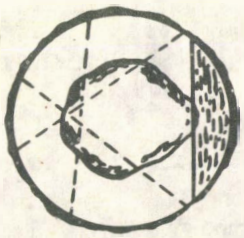
Chopping out the Corners

Sawing off the Corners

Felling Rotten Trees

Rotten butted trees present a difficult felling problem. It is very hard to anticipate the time or to control the direction of their fall.

In many cases it is possible to make the felling cuts high enough to avoid the worst of the rot. This not only makes for safer felling, but also saves the time which would be required to saw the rotten wood off the butt log. When the rot goes up the tree too high for this, it may be possible to chop or saw around the rot with cornering cuts similar to those used for leaning trees.



Sawing around the Rot

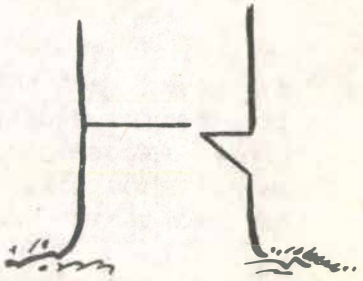
Highstump to avoid Rot

When the butt of the tree is badly rotted, it is much safer to chop it down and not use the saw at all.

It is necessary to be more than usually alert when felling a rotten butt tree. It is likely to fall at almost any time and it is almost impossible to control the direction in which it falls.

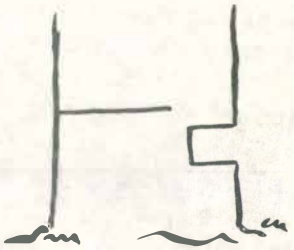
Felling with the Chain Saw

In felling with the chain saw a slightly different technique is called for.


Humboldt Undercut

In the first place, with the mechanical saw, an uphill cut is much more feasible than it is with hand tools. Consequently many chain fallers make their undercut upside down, sawing out both sides. This type of cut, which was originated in California, is called the Humboldt. Its principal advantage is that it leaves a more nearly flat end on the butt log, and wastes less of the most valuable lumber in the tree than the conventional undercut. It takes a little practice, for the two sawyers working together to make the corners of the Humboldt cut come out exactly even every time.

Easier for inexperienced men, but slightly more work, is the cut made with two parallel sides. The top cut of this type of undercut is slightly below the level of the backcut so it, too, results in a complete butt log. The wood between the two parallel saw cuts is gouged out with a Pulaski tool, which is an adze-like blade attached at the back of a single bit axe.


Parallel Undercut

Conventional undercuts, with the top part chopped out, are also used with the chain saw, especially for smaller timber.

Pulaski Tool

The greatest difference in working with the chain saw, as compared with hand tools, is the rapidity with which it cuts. Old time wood-cutters are continually astounded at how quickly they can chew through a sizeable hardwood. A 24-inch sugar maple has been cut through in 30 seconds, and a 54-inch

pine in 70 seconds. Hand falling would take at least five times as long.

Consequently, it is much more important for each of the fallers to have his getaway route well in mind, and for them to constantly guard against cutting the tree all the way through. Since the saw motor makes so much noise it is also well for them to have a set of signals, to tell each other how close to the undercut each side is getting, and to signal each other when to stop the motor for wedging or any other reason. The third man in the saw crew is valuable for transmitting these signals, as well as in changing off with regular crew members to reduce fatigue.

Whenever possible the chain saw should be removed from the cut and put in a safe place before wedging is started. If this is impossible the two men handling the saw should take it out as soon as the tree starts to tip. Many a good chain saw has been ruined by leaving it on or too close to the stump.

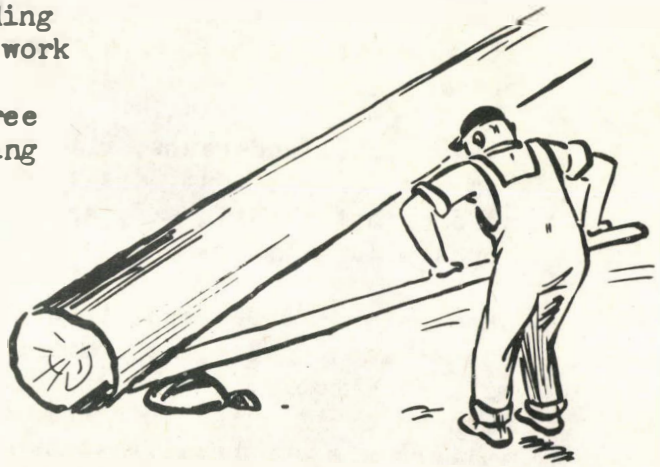
Size up how seriously tree is lodged

Getting down lodged trees:

Even the best of fallers sometimes lodge the tree they are cutting in a standing one. An exceptionally sturdy limb on either the tree being felled or the one in its way may fail to bend as expected, or the falling tree may fall a little out of line, or be twisted out of line. The better and more experienced the falling crew the fewer trees they will lodge. But all cutters need to know how to dislodge such trees.

Such dislodging may be easy and safe, or it may be very difficult, depending on conditions. No one method will work in every case. It is important to be able to diagnose how firmly a tree is lodged, and what method of getting it down might work.

If the tree is lightly lodged cutting it loose from its stump and prying it off to the ground is sometimes enough. Pushing or twisting it loose is a next step which is frequently successful when only the ends of the branches are caught. Prying the whole tree backward

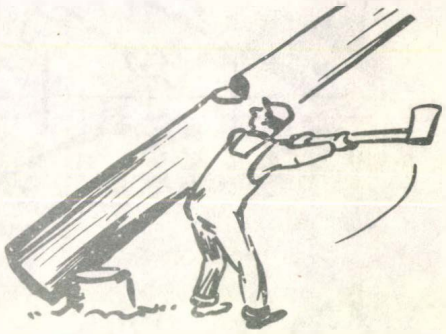


Prying lodged tree backward sometimes brings it down

away from the one in which it is lodged is a more strenuous measure for more difficult cases. Climbing up the inclined trunk of the lodged tree, and attempting to shake it loose by jumping up and down on it is a highly dangerous procedure, not recommended for even the most experienced men. Many serious injuries and even deaths have resulted from attempting this.

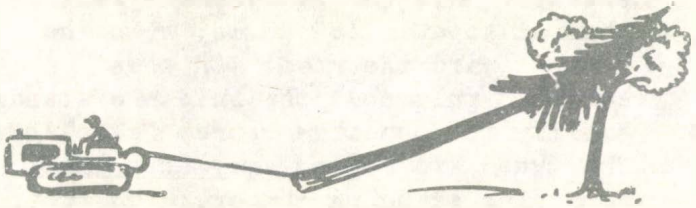
NEVER TRY THIS

Cutting off the butt log of the lodged tree, either with a saw or axe is another highly dangerous practice which is sometimes used. Considerably safer, and apt to be even more effective, is felling another tree across the lodged one. If this second tree is 18 or 20 feet away, and hits the lodged tree solidly a similar distance up its trunk, it is quite apt to break it loose.



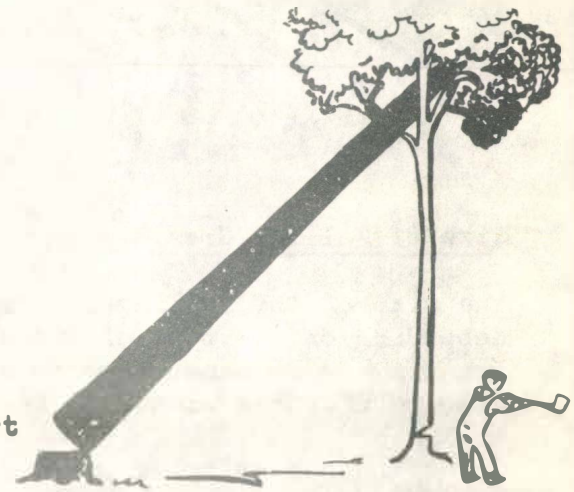
THIS IS DANGEROUS

The safest and best way to dislodge a lodged tree is to hitch a tractor or horse to the butts of the tree and pull it down.



This will work — if you have a tractor

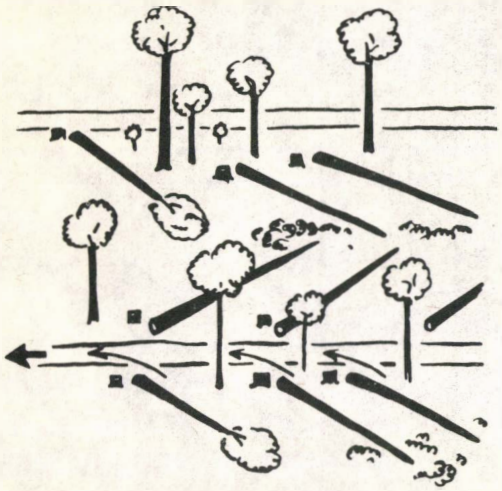
The last resort, and perhaps the most dangerous practice of all, is to cut the tree in which the first one is lodged. This is particularly dangerous because it is difficult to judge the stresses involved, or the way in which the two trees will fall, or the time at which they will fall. If this becomes necessary it is best to have the most experienced and alert man in the crew do it by chopping alone, because he will be in a better position for a getaway than a saw crew, and better able to judge the time and direction in which to run.



Last resort-should be done by quickest man in crew

Layout of the Felling Job

The more general layout of the felling job is highly important. This ordinarily is the responsibility of the logging superintendent, and it will be discussed in greater detail in a later section of this Handbook. The woodcutter should know something about it, however, so a brief discussion is given below:



Where conditions permit, much time and work can be saved by felling the trees so that tops and branches can be left where they fall. On some operations where parallel roads are provided all trees are felled away from the road, so that the tops are "windrowed" in the middle of the space between the roads. On other jobs the tops of several trees are felled together in a jackpot. Tops should never be dropped into a road or skidtrail if it can possibly be avoided.

It is important, particularly on jobs where the tree trunks are to be skidded out in long lengths, to fell the trees so that they can be removed most easily. This generally means felling them at about a 45° angle, with the butts toward the road. On some softwood pulpwood jobs in dense stands exactly the opposite course is followed. The trees are felled away from the remaining standing timber, with their tops toward the road. This reduces lodging, and a heavier load can be carried under the tractor arch when the trees are hauled in top first.

Size of Felling Crew

The size of the felling crew may vary from one man to eight or more, depending on the type of timber being cut, the amount of limbing and swamping to be done, and the method of logging. This subject will also be discussed later on in this Handbook.

On northwoods softwood pulpwood jobs, felling is most frequently done by one man working alone, equipped with a "boy's" axe, a 42-inch bowsaw, a kerosene bottle, and some hardwood wedges. Payment is by the cord, and the men find they make much more money working alone.

On hardwood pulpwood and mine timber jobs two-man crews are most common. The crew is equipped with a narrow crosscut saw, a man-sized axe, steel wedges and a maul, and, if the wood is to be bucked, with a measuring pole.

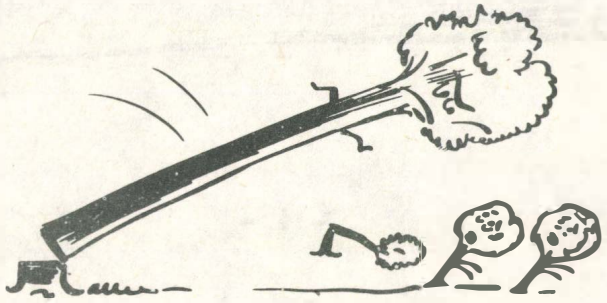
On sawlog jobs in softwood a two-man crew is also common. Equipment generally consists of a heavy crosscut saw, a 3½-lb. axe, kerosene bottle, wooden wedges, and, if the logs are to be bucked in the woods, a measuring pole.

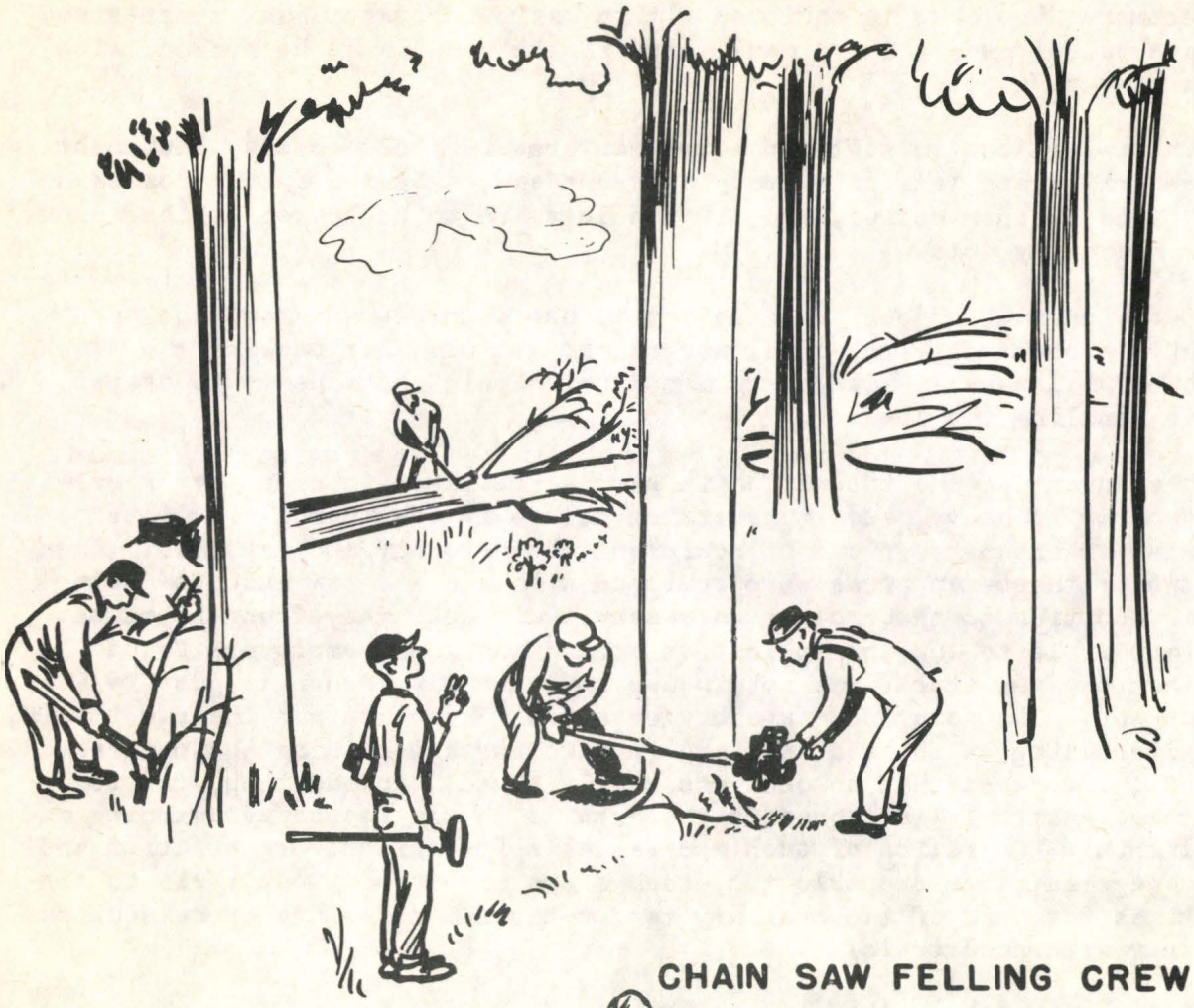
Hardwood sawlog jobs are more apt to use a three-man crew, equipped with a crosscut, axe, steel wedges and a maul. For bucking the crew will usually also carry a measuring pole and a peavy to assist in handling the logs.

The advent of the two-man chain saw has resulted in even larger crews. The saw is heavy, and it is tiring to use it continuously. It is also an expensive piece of equipment, both to buy and maintain. When two or three-man crews were equipped with a chain saw and its tools, in addition to their other necessary equipment, they found it almost impossible to lug the collection around and their employers found that the saw itself was not in use continuously enough to justify its upkeep. The solution was a bigger crew. Three men run the saw itself, alternating on the two ends and in watching and guiding the progress of the work so that no one gets overly tired. In addition, two to three axemen are attached to the crew to do the necessary swamping and limbing. Operation of such a crew calls for careful organization and management, but properly run, such crews are turning out three to ten times the work of the ordinary two or three-man felling crews equipped only with hand tools.

Conservation in Felling

Young trees, particularly those of the more valuable species, should be protected for future growth and later cuts wherever and whenever possible. A good logger will never unnecessarily destroy promising young growth by cutting it when it really is not in the way or wantonly drop older trees into it. Most old timers have seen the same tract cut over two or three times and they know that they, or their sons, will want good timber to cut again.





CHAIN SAW FELLING CREW